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U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN 487.

CHEESE AND ITS ECONOMICAL
USES IN THE DIET.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
OFFICE OF EXPERIMENT STATIONS,
Washington, D. C., January 16, 1912.

SIR: Since cheese is one of the important agricultural products of the United States and a foodstuff used in a larger or smaller quantity in nearly every American home, it seemed desirable to study its relative nutritive value and the ways in which it may be prepared for the table.

Although it is so generally liked, there seems to be a widespread belief that it is not well digested and that it is a cause of physiological disturbances. Neither of these beliefs is substantiated by the results of the extended series of digestion experiments undertaken as part of the nutrition investigations of the Office of Experiment Stations. Indeed, cheese was found to be very thoroughly digested, ranking with other staple foods in this respect. Moreover, experiments made with the respiration calorimeter did not indicate that it was less easy of digestion than a comparable amount of meat.

In the studies of the digestibility of cheese the Bureau of Animal Industry cooperated with the Office of Experiment Stations and was also of great assistance in securing, for experimental purposes, cheese made and cured under controlled conditions. Supplementing the experiments as to the nutritive value of cheese, many tests were made of methods of preparing cheese for the table, the main purpose being to suggest dishes and combinations of such a character that the cheese might replace other nitrogenous material and fat when this seemed desirable.

The bulletin was prepared by C. F. Langworthy, chief of nutrition investigations, Office of Experiment Stations, and Miss Caroline L. Hunt, who has had wide experience in the study of both scientific and practical problems in nutrition. The recipes were collected from many sources and in the majority of cases were studied experimentally by Miss Hunt.

Acknowledgment should be made to teachers of home economics in agricultural colleges and other educational institutions, to housekeepers, and others who have supplied data of great value in preparing the bulletin.

Respectfully,

A. C. TRUE,
Director.

HON. JAMES WILSON,
Secretary of Agriculture.

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CHEESE AND ITS ECONOMICAL USES IN THE DIET.

INTRODUCTION.

Cheese is believed to be the oldest of the dairy products and the first form in which milk was preserved for future use. One may conjecture that it owes its origin to the accidental storing and ripening of sour milk curd. Although it has been a staple food with many races for uncounted years, there is a widespread belief that it is suitable for use chiefly in small quantities as an accessory to the diet, and that in large quantities it is likely to produce physiological disturbances. We are inclined, therefore, to think of those who make cheese one of the chief articles of their diet as being driven to this course by necessity rather than being led to it by choice.

Because of these opinions extensive studies have been carried on as a part of the Department Nutrition Investigations, of the food value, thoroughness of digestibility, ease of digestion, physiological effect, and special character of cheese as food as well as of methods which are followed in preparing it for the table. The conclusion drawn from this extended study is, in brief, that cheese properly prepared and used is not generally a cause of physiological disturbances, and that it may easily be introduced into the bill of fare in such quantities as to serve as the chief source of nitrogenous food and may be made a substitute for other nitrogenous foods when such substitution is desired.¹ The results of these studies have been brought together in this bulletin with a view to making them helpful to all interested in the subject, but particularly to housekeepers.

From the standpoint of the housekeeper, cheese is of importance because of its high nutritive value, particularly its high percentage of protein or muscle-forming materials, because of the ease with which it can be kept and prepared for the table, and because of its appetizing flavor and of the great variety of ways in which it can be served.

From the point of view of agriculture cheese is an important commodity. The latest census figures available show that considerably over 300,000,000 pounds are made yearly in the United States, the value of the product being nearly \$29,000,000, and the amount of money invested being over \$6,000,000. The figures quoted are from the census report which first separated the details of the cheese

industry from those of the butter and condensed-milk industries. From earlier statistics available, however, it is fair to judge in a general way of the development of any one of these industries from the figures given for the three industries combined. In general, these figures show that there was a great leap forward in the three industries in the decade between the years 1880 and 1890, and that since that time there has been a continuous, steady, healthy growth in the business of cheese making.

As might be expected, the amount of the product and the amount of money invested have increased more rapidly than the number of men employed, indicating that, as in most manufacturing industries, labor-saving devices and other improvements have reduced the proportion of physical labor required.

As regards the kind of cheese made in the United States, the figures show that of the amount produced in 1905 approximately three-fourths was what is known to the trade as standard factory cheese, or what is usually known to the retail purchaser as American cheese. A very small per cent—1.1 per cent—was skim-milk cheese, the remainder being American modifications of certain important foreign brands, Neufchâtel, Camembert, and others.

From the standpoint of the retail dealer, cheese is important because it is a convenient article to handle. Its percentage of nutrients being high and its percentage of water low, it is not bulky. It is comparatively easy, too, to preserve in good condition. The difficulty of cutting exact amounts called for by customers may be considered the chief inconvenience. Efforts have been made to obviate this difficulty by making small cheeses. Experiments have been reported from the Oregon Experiment Station¹ on the canning of cheese in pound lots; and from the Wisconsin Experiment Station² in making cheese prints like those in which butter is commonly sold. In some of the factories cheeses weighing about 5 pounds and having the same shape as the larger cheeses are made. These are convenient for use in families where a large amount of cheese is eaten, and furthermore cheese in such form dries out and spoils less quickly and easily than cheese cut in wedge-shaped slices, as it usually is when sold by the pound. A convenient way of keeping and using such cheese is given on page 11.

The sale of cheese in pots is another way of overcoming the difficulty of cutting exact amounts. Cheese thus prepared is, as a rule, softened by the addition of butter fat or other fat, with the idea of making it of such consistency that it can be used like soft cheeses.

There is something to be said also of the value of cheese to that not inconsiderable number of individuals who must occasionally cater

¹ Oregon Sta. Bul. 78.

² Wisconsin Sta. Rpt. 1901, p. 132; U. S. Dept. Agr., Farmers' Bul. 166.

for themselves—those men and women in business life, for example, who find it convenient neither to carry lunches nor to go to restaurants. For these, cheese offers a convenient way of supplying the necessary protein, for it can usually be obtained in good condition in any neighborhood. Combined with crackers, some of the ready-cooked cereals, or bread, and with fruit, it makes a fairly well-balanced meal.

CHEESE MAKING.

Though the chief points in the manufacture of cheese are well known, and are discussed in detail in other publications¹ of this department, it may not be out of place to review them here. Cheese is made ordinarily from whole milk, and most of the kinds best known in the United States from cows' milk. In every 8 parts of milk by weight there is approximately 1 part of solid nutrients, the remainder being water. For our present purpose we may think of the nutrients as being equally divided into three groups—protein substances (casein and albumin principally), fat, and milk sugar. In the process of cheese making the casein, which constitutes more than three-fourths of the proteids of the milk, is precipitated by rennet, forming a curd. Most of the fat attaches itself to this curd. The curd is broken up, and the whole is heated to a temperature between 96° and 108° F. The whey is drained off and carries with it most of the milk sugar and the albumin. The curd is salted and pressed. It is kept for several weeks or longer in a cool place, where it "ripens," developing flavors through the action of bacteria or other micro-organisms, and also undergoing certain other marked changes.

The average cheese while fresh and moist contains proteids and fat in much the same ratio as that in which they are found in the milk. More than one-fourth its weight is proteid, about one-third fats, and one-third water. There are always present small amounts of albumin and sugar which have clung to the curd. Owing to the addition of salt, the percentage of mineral matter is high compared with that of most other foods.

In ripening, cheese changes in texture and its original pastiness gives away to a somewhat granular consistency in some types, or to a waxy or a buttery consistency in others.

The above brief outline refers only to the essentials of cheese making. In practice, there are many variations with respect to the kind of milk used, the proportion of butter fat or cream retained in or added to the milk, with respect to the methods followed in separating, preparing, seasoning, and handling the curd, and to the handling and ripening of the cheese. It follows that there is an almost endless

¹ U. S. Dept. Agr., Farmers' Buls. 166, 225, 244; Bur. Anim. Indus. Buls. 105, 146.

number of cheeses with different names and of different appearance and flavor.

Cheese making was formerly a home or farm industry, but is now, in the United States at least, very largely a commercial enterprise carried on in factories. It differs from many industries in that the factories are almost always located in the country or in the smaller towns rather than in large cities, this being more true of cheese making than of the manufacture of potted cheeses or other special articles, which has become a large industry. It is worthy of mention in this connection that the making of cheese crackers and other bakers' goods in which cheese is an ingredient has developed into an important part of the baking trade.

KINDS OF CHEESE USED IN AMERICAN HOMES.

The American factory cheese—the so-called American cream cheese—is of the English Cheddar type, and as it is the most commonly used of all the commercial varieties in the United States, may be taken as a standard. Other types are, however, well known, particularly in cities and large towns where there are well-stocked markets and stores, and it is interesting to note also, at least briefly, the characteristics of some of them. Full descriptions of a very large number of cheeses (about 250 in all) may be found in an earlier bulletin of this department.¹

CHEDDAR AND AMERICAN FULL-CREAM CHEESE.

Cheddar cheese—named from the English village where it originated—is a comparatively old type of cheese, very popular in England and also in the United States. The name is now more fitly applied to a process than to any particular shape.

Cheddar cheese is made from sweet cows' milk, which may be skimmed, partly skimmed, or unskimmed. If made from unskimmed milk the cheese is called "full cream." If cream is removed the cheese is designated "part-skim" or "skim," as the case may be.

Cheese of Cheddar type as made in the United States is perhaps most often marketed in large, flat, round forms, 13 to 16 inches in diameter, about 5 or 6 inches in height, and weighing 26 to 32 pounds each, though other shapes and sizes are also fairly common. It is usually pale to darker yellow in color, though it may be white when uncolored. When fresh it is mild in flavor, but when well ripened has a characteristic and sharp taste. The new cheese is soft, though not waxy, in texture, and may be easily shaved or broken into small pieces. When well ripened it may be finely grated.

These characteristics, together with its distinctive and peculiar flavor and its wide distribution in the markets, are qualities which

¹U. S. Dept. Agr., Bur. Anim. Indus. Bul. 146.

help to make it the variety most commonly used in the United States.

Sage cheese is a variety of Cheddar cheese, which is flavored with sage and is further characterized by the green mottled appearance formerly due to bits of sage leaf but now generally obtained in another way.

ENGLISH DAIRY CHEESE.

From the standpoint of the cook who frequently wishes to use grated cheese this variety is important. Though made in much the same way as Cheddar, it differs from it, in that the curd is heated to a somewhat higher temperature, and the cheese is therefore harder. It commonly sells for somewhat more per pound than the standard or American factory variety and is likely to be found only in the larger markets.

SOFT CREAM CHEESES.

Cream cheese true to name is made from rich cream thickened by souring or from sweet cream thickened with rennet. The whey is removed by draining. It is then covered, salted, and turned occasionally, being ready for market in 5 to 10 days. A variety is also made with rennet from cream of low fat content, as well as a number of other special sorts much more common in France than in the United States.

The term "cream cheese," however, is an elastic one and includes many varieties which are sold under special trade names. Such cheese is common in most markets.

Soft cream cheese differs from standard cheese, so far as composition is concerned, in having more water and fat and less protein, water usually making up about one-half of the total weight. It differs also in being much more perishable. These cheeses commonly sell for 10 or 15 cents each, which is about 40 to 50 cents a pound.

Of late there have been on the market varieties of such cheese or of Neufchâtel, made by combining the cheese with chopped pimienta. These bring a relatively high price in market and may be easily prepared at home if this seems more convenient. (See p. 34.)

NEUFCHÂTEL CHEESE.

This very popular variety—named from a town in northeastern France—is similar in appearance and in the way it is marketed to soft cream cheese. It is made either from whole or skim milk curdled with rennet. After draining and pressing, it is kneaded thoroughly, formed into small rolls or blocks, and then ripened until special molds develop, which requires about four weeks. It is then wrapped in tin foil and marketed.

PARMESAN CHEESE.

This is a name given outside of Italy to a very hard cheese which in that country is said to be known as Grana, a name given because of the granular appearance which it has after it has been broken. It is sometimes sold in grated form and brings a relatively high price, but is more commonly sold ungrated. When well made it will keep for years and may be easily broken and grated. It is very generally used in Europe for serving with soups, for seasoning macaroni, and for other similar purposes, and is quite common in American markets.

SAP SAGO.

This is a skim-milk cheese made in Switzerland, which is suitable for grating. It contains, for every 4 pounds of cheese, 1 pound of a clover (*Melilotus cæruleus*) grown in Switzerland. It is greenish in color and has an unusual flavor. It is not high-priced.

GORGONZOLA AND ROQUEFORT.

These are highly flavored cheeses characterized by the presence of molds through their entire mass. Roquefort is made from the milk of sheep; Gorgonzola, from cows' milk.

POTTED OR SANDWICH CHEESES.

Ordinary cheese is often mixed with butter or oil in the proportion of 5 parts of cheese to 1 of butter or oil, by weight. The mixture is sometimes seasoned with mustard or with curry powder. Such cheeses, unseasoned or seasoned, are on the market in great variety. Potted cheese may be easily prepared at home if the housekeeper wishes to take the trouble.

SWISS CHEESE (EMMENTALER, GRUYÈRE, ETC.).

This term as used in America is somewhat vague. Different names are given to the varieties according to the districts of Switzerland in which they are made, but they are all similar and characterized by a mild, sweetish flavor and the presence of large holes or "eyes." Foreign and domestic brands are to be found in most markets. They are suitable for cooking purposes, as well as for use without being cooked, and are much used in this way in Europe and well known and liked in the United States.

EDAM CHEESE.

This is a cheese made in Holland. It is molded in spherical form, and the outside is usually dyed red. It is usual in this country to cut off a section of the top, which serves as a lid, and to scoop out the

inside as needed. In Holland it is frequently served in slices, particularly when it is fresh. Edam cheese is seldom used in cookery in American homes, though thrifty housewives, after the greater part of the cheese has been removed, often stuff the hollow shell with cooked and seasoned macaroni, rice, or something similar and bake.

BRIE AND CAMEMBERT CHEESE.

These are very soft rennet cheeses of foreign origin and of somewhat smaller nutritive value than standard cheese, and of strong flavor and odor. They are not often used in cookery, but are used as an accompaniment to other foods. The Bureau of Animal Industry and the Connecticut Storrs Experiment Station in cooperation have experimented with the making of Camembert cheese with marked success, and have published a full account of the work.¹

COTTAGE CHEESE.

Cottage cheese and other sour milk and cream cheeses, junket, Devonshire cream, and a number of other cheese-like products are described in the section which deals with homemade cheese.

THE CARE OF CHEESE IN THE HOME.

One of the best ways of keeping cheese which has been cut is to wrap it in a slightly damp cloth and then in paper, and to keep it in a cool place. To dampen the cloth, sprinkle it and then wring it. It should seem hardly damp to the touch. Paraffin paper may be used in place of the cloth. When cheese is put in a covered dish, the air should never be wholly excluded, for if this is done, it molds more readily.

In some markets it is possible to buy the small whole cheeses mentioned on page 6. These may be satisfactorily kept by cutting a slice from the top, to serve as a cover, and removing the cheese as needed with a knife, a strong spoon, or a cheese scoop. It is possible to buy at the hardware stores knobs which inserted in the layer cut from the top make it easy to handle. The cheese below the cover should be kept wrapped in a cloth.

CHEESE AS A FOOD.

Cheese is used in general in two ways—in small quantities chiefly for its flavor and in large quantities for its nutritive value as well as for its flavor. Some varieties of cheese are used chiefly for the first purpose, others chiefly for the second. Those which are used chiefly for their flavor, many of which are high priced, contribute little to the

¹ U. S. Dept. Agr., Bur. Anim. Indus. Buls. 71, 98, 109, 115, 120, Circ. 145; Conn. Storrs Sta. Buls. 35, 46, and 58.

food value of the diet, because of the small quantity used at a time. They have an important part to play, however, in making the diet attractive and palatable. The intelligent housekeeper thinks of them not as necessities, but as lying within what has been called "the region of choice." Having first satisfied herself that her family is receiving sufficient nourishment, she then, according to her means and ideas of an attractive diet, chooses among these foods and others which are to be considered luxuries.

Those cheeses, on the other hand, which are suitable to be eaten in large quantities and which are comparatively low priced are important not only from the point of view of flavor, but also from the point of view of their nutritive value. Among such cheeses the one which, as noted above, is known to the trade as standard factory cheese and to the housewife as American cheese stands out pre-eminently. Therefore when the word "cheese" is used without specification in the following pages it may be taken to refer to this particular variety.

THE FLAVOR OF CHEESE.

Cheese owes its flavor to the fatty acids and their compounds which it contains and to ammonia-like bodies formed during ripening from the cleavage of the casein, to salt added to the curd, and in some varieties, like Roquefort, to bodies elaborated by molds which develop in the cheese. In the highly flavored sorts some of the fatty acids of a very marked odor are present in abundance, as are also the ammonia-like bodies. Indeed, in eating such cheese as Camembert a trace of ammonia flavor may often be plainly detected.

The cleavage of the nitrogenous material of the cheese and other changes are brought about chiefly by the action of enzymes originally present in cheese or by microorganisms and are to be regarded as fermentative and not as putrefactive changes.

The liking for highly flavored cheeses of strong odor is a matter of individual preference, but from the chemist's standpoint there is no reason for the statement often made that such cheeses have undergone putrefactive decomposition.

COMPOSITION OF CHEESE AND SOME OTHER FOODS COMPARED.

In the present state of our knowledge concerning dietetics it seems best to give the housekeeper general rather than absolute rules with respect to the kind and amount of food which should be eaten at any meal or at any given time by persons in normal health living under usual conditions. It is not necessary, therefore, for the housekeeper to know the exact composition of food materials in order to cater well for her family, a rough approximation being sufficient for the purpose. In the case of cheese she will be near enough to the fact if

she thinks of it as composed approximately of equal parts by weight of proteids, fats, and water. This rough conception is sufficient to associate it in her mind with the foods of high proteid value, a point which is important in connection with the making of bills of fare. It should lead her to class it also with the foods which are rich in fat and prevent her from combining it unnecessarily with other fatty foods.

In order, however, that the question of the use of cheese in the diet may be adequately discussed, knowledge of its composition in comparison with other foods is desirable, and there is an abundance of data available on this subject, since the composition of cheese and other foods has often been investigated at the Department of Agriculture, in experiment station laboratories, and in many other places where nutrition problems are studied. An extended summary of analyses of cheese of different sorts is included in an earlier publication of this department.¹

Data regarding the composition of cheese and a few other common foods are summarized in the following table:

Average composition of cheese and some other common foods as purchased, and also on the basis of edible portion.

Food materials.	Refuse.	Water.	Protein.	Fat.	Carbo- hydrates.	Ash.	Fuel value per pound.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Calories.</i>
Cheese.....		34.2	25.2	33.7	2.4	3.8	1,950
Beef of average composition as purchased.....	18.6	50.5	15.2	15.5	.....	.7	935
Edible portion.....		82.2	18.8	18.8	.....	.9	1,145
Porterhouse steak as purchased.....	12.7	52.4	19.1	17.9	.....	.8	1,110
Edible portion.....		60.0	21.9	20.4	.....	1.0	1,270
Loin steak, broiled, edible por- tion.....		54.8	23.5	20.4	.....	1.2	1,300
Dried beef.....		53.7	26.4	6.9	.....	8.9	790
Eggs as purchased.....	11.2	65.5	13.1	9.3	.....	.9	635
Edible portion.....		73.7	13.4	10.5	.....	1.0	729
Milk.....		87.0	3.3	4.0	5.0	.7	310
Bread.....		35.3	9.2	1.3	53.1	1.1	1,215
Potatoes as purchased.....	20.0	62.6	1.8	1.1	14.7	.8	295
Edible portion.....		78.3	2.2	.1	18.4	1.0	385
Apples as purchased.....	25.0	63.6	.3	.3	10.8	.3	190
Edible portion.....		84.6	.4	.5	14.2	.3	290

It will be seen from the above table that cheese has nearly twice as much protein, weight for weight, as beef of average composition as purchased and that its fuel value is more than twice as great. It contains over 25 per cent more protein than the same weight of porterhouse steak as purchased, and nearly twice as much fat.

As shown by the figures in the above table, cheese contains 3.8 per cent ash. Of this a considerable part may be salt added in cheese making. Like the milk from which it is made, cheese ash is characterized chiefly by the presence of calcium (lime), magnesium,

¹ U. S. Dept. Agr., Bur. Anim. Indus. Bul. 146,

phosphorus, and iron, the average values as given in earlier bulletins of the department¹ being 1.24 per cent calcium oxid, 0.049 per cent magnesium oxid, 1.49 per cent phosphorus pentoxid, and 0.0015 per cent iron.

The total amount of the mineral matter needed per day by the body is relatively small, yet mineral matter is very important. It is commonly assumed and is probably true, that a mixed diet reasonably varied and reasonably generous will supply all the ash constituent which the body requires. If for any reason calcium and phosphorus are lacking in the diet, the amounts may be readily increased (as pointed out in one of the publications just cited) by a free use of milk and such milk products as cheese and junket, without decreasing the palatability of the diet or materially increasing its cost.

NUTRITIVE VALUE AND COST OF CHEESE AND SOME OTHER FOOD MATERIALS.

Since the market prices of foods vary, it is difficult to compare the amounts of nourishment secured for a given sum, 10 cents say, in buying different food materials. We may, however, suppose that foods have certain prices and make the comparison on this basis. In the following table the amount of cheese obtained for 10 cents when cheese costs 22 cents a pound is shown, together with the protein and energy value of this quantity, this value being compared with similar values for a number of other common foods at certain assumed prices per pound.

Amounts of protein and energy obtained for 10 cents expended for cheese and other foods at certain assumed prices per pound.

Food materials.	Price.	10 cents will buy—	10 cents' worth will contain—	
			Proteid.	A fuel value of—
		Ounces.	Ounces.	Calories.
Cheese.....	22 cents per pound..	7.3	1.9	886
Beef, average.....	20 cents per pound..	8.0	1.2	467
Porterhouse steak.....	25 cents per pound..	6.4	1.3	444
Dried beef.....	do.....	6.4	1.6	315
Eggs.....	24 cents per dozen..	10.0	1.3	198
Milk.....	9 cents per quart..	38.3	1.2	736
Wheat bread.....	5 cents per pound..	32.0	2.9	2,400
Potatoes.....	60 cents per bushel..	160.0	.....	2,950
Apples.....	1½ cents per pound..	106.7	.....	1,270

Since cheese is ready to be eaten when it comes from the market, it may be more interesting for some purposes to compare its composition with that of cooked beef, freed from bone and from super-

¹ U. S. Dept. Agr., Office Expt. Stas, Buls. 185 and 227.

fluous fat, such a piece as would be served to a person at the table. Weight for weight, cheese has appreciably more protein than such cooked beef, and 50 per cent more fat.

So far as its composition is concerned, then, cheese is entitled to be considered as directly comparable with meat. The possibilities of using cheese and some other food materials in the same way as meat is discussed in some detail in an earlier publication of this department.¹ It is so used by the peasants of some parts of Europe, and was formerly so used among many other groups of people. The fact that it is not more commonly so used in this country is probably due to several causes. One cause is habit, which makes the meal seem incomplete unless it includes meat; another is the fact that since cheese has a more pronounced flavor than meat, it is not so likely to be generally acceptable as the chief food of a meal. There is always likely to be at least one member of the family who does not relish it in quantity. Another cause is the fact that it is commonly believed to be indigestible, and still another is the fact that housekeepers, through lack of experience, are much less skillful in the arrangement of bills of fare in which cheese is the central food than they are in arranging bills of fare in which meat is thus used. These last two causes will be considered in sections which follow.

THE DIGESTIBILITY OF CHEESE.

As was stated above, cheese has been thought a cause of digestive disturbances, but work recently done by the Office of Experiment Stations, in cooperation with the Bureau of Animal Industry, and briefly summed up in a recent publication tends to disprove this.²

In the large number of experiments which were conducted, young men in good health were fed on a diet consisting of bread and fruit combined with American factory cheese which was made with different amounts of rennet and in different stages of ripening. The results showed that over 90 per cent of the nitrogenous material of the cheese was digested—that is, retained in the body—and nearly 90 per cent of the energy it supplied was available. In other words, cheese compares favorably with other foods in thoroughness of digestion—that is, in the percentage finally digested. Furthermore, it did not cause constipation or other physiological disturbances.

The above statement refers to full-cream cheese. Experiments made at the same time gave practically the same values for the digestibility of skim-milk cheese, of Swiss cheese, of Roquefort and Camembert cheese, and of cottage cheese.

Artificial digestion experiments made at the Minnesota Agricultural Experiment Station³ indicate that cheese protein is digested

¹ U. S. Dept. Agr., Yearbook 1907, p. 367.

² U. S. Dept. Agr., Bur. Anim. Indus. Circ. 166.

³ Minnesota Sta. Bul. 74.

by the ferments of the intestines rather than by those of the stomach, and this is suggested as a reason for its reputation as a "hearty" food, the belief being that some foods which remain in the stomach longer than the average time, or are not digested by the stomach, are "hearty." Cheese protein (casein) is intimately associated with fat, and there is experimental evidence to show that this condition has an effect upon the progress of digestion in the stomach.

The burning sensation or similar sensations sometimes experienced after eating certain sorts of cheese has been attributed to the presence of small amounts of free fatty acids.¹ It is commonly said that cheese is difficult to digest, the idea being that the body expends more labor in assimilating it than is required for other comparable foods. Experiments recently carried on by the Office of Experiment Stations in which the respiration calorimeter was used to study the energy expenditure during the period of active digestion, do not indicate that cheese differs materially in ease of digestion from a comparable amount of meat.² Uncooked full-cream cheese was used in these experiments. Another series recently begun by the Office of Experiment Stations with cooked cheese, though not yet sufficiently advanced to be conclusive, indicates that cheese thus eaten does not differ materially from raw cheese in this respect.

In connection with the use of cooked cheese in the diet, one fact should always be kept in mind. This is that, in common with all other fatty foods, cheese which has been overheated in cooking is likely to contain burned—that is, decomposed—fats. Disturbances from this cause, however, should be laid to poor cooking and not to the composition of this special food.

The use of potassium bicarbonate has often been recommended for increasing the digestibility of cheese, the amount suggested being a level teaspoonful to a pound of cheese. That the bicarbonate renders the cheese soluble in any appreciable degree, as has been claimed, is not apparent from a number of experiments which have been made. It does, however, neutralize some of the free fatty acids of the cheese, thus destroying some of the characteristic flavor. To some people this may be an advantage, but to others it would be counted a disadvantage.

THE USE OF CHEESE IN THE DIET.

It has been the purpose, in preparing this discussion of cheese, to consider ways in which mild-flavored sorts may serve as staple articles of diet, rather than the use of highly flavored varieties as appetizers

¹ Hutchison's "Food and the Principles of Dietetics," London, 1901, p. 145.

² U. S. Dept. Agr., An. Rpt. Sec. 1910, p. 149; Rpt. Office Expt. Stas. 1910, p. 35; Yearbook 1910, p. 359.

and as accompaniments of other foods. The use of highly flavored cheese as a condiment is customary and may profitably be extended, since it offers a simple way of adding to the attractiveness of the diet. The variety of the cheese selected is a matter of choice, some persons preferring such kinds as well-ripened American full-cream cheese or the potted cheeses, and others such sorts as Roquefort, Camembert, and other varieties. From the physiologist's standpoint, cheese used in this way for its flavor should really form a part of a well-balanced meal rather than be added to a meal which already supplies an abundance of nutritive material. In other words, condimental cheeses may better accompany a moderate than a very generous menu.

In considering the use of cheese in quantity as an integral part of the diet there are many possibilities from simple combinations like bread and cheese to elaborate dishes in which cheese is used as a flavor and as a principal constituent.

As has been pointed out, cheese, being rich in both protein and fat, would logically replace such foods as meat, fish, and eggs when taken in quantity, rather than cereal foods characterized by a large amount of starch, or succulent foods, such as vegetables and fruits. In planning menus of which cheese forms a large part the housekeeper should bear these facts in mind.

BILL-OF-FARE MAKING WITH CHEESE AS THE CENTRAL FOOD.

Since meat has so generally been the chief protein food of a meal, and the kind selected usually has determined the choice of vegetables and condiments, it is not strange that very many housekeepers should be inexperienced and consequently unskillful in planning meals in which cheese is substituted for meat when for any reason they may desire to make such a change. In seeking skill they might take a suggestion from the experiments to which reference has been made, and also from a case investigated and reported by the Office of Experiment Stations, of a man who lived for months upon a diet of bread, fruit, and cheese, and who remained in good health and active, and did not weary of the monotony of the diet.

The first two articles of the diet mentioned, namely, the bread and the cheese, could have been taken in such amounts as to constitute what is usually considered a balanced ration, i. e., in such amounts as to supply the right quantity of muscle-forming foods in comparison with the energy value. The bread and cheese taken with the fruit, however, make a ration which is well balanced not only in the older and more widely accepted sense, but also in the more modern sense that it makes an attractive and palatable combination of foods, as well as a balanced ration, and thus favors digestion. The watery

and refreshing fruits or succulent vegetables with their large supply of cellulose are a pleasant contrast to the concentrated and fatty cheese.

Housekeepers would probably find that if in planning menus of which a cheese dish is the chief feature they were to take pains to supply also crisp, watery vegetables, water cress, celery, lettuce served with a dressing or with salt alone, or simple fruit salads, and would give preference to refreshing fruits, either fresh or cooked, rather than to what are known as heavy desserts, they would in general be more successful in pleasing those who are served.

There is another point also to be considered in combining cheese with other foods. Whether it is raw or cooked it is likely to be somewhat soft, and so seems to call for the harder kinds of bread—crusty rolls or biscuit, zweiback, toast, pulled bread, rye bread, the harder brown breads, or crackers, and some of the numerous crisp ready-to-eat cereal breakfast foods. Brittle cookies, too, seem more suitable than rich soft cakes or puddings for the dessert in such meals.

A few bills of fare are given below which experience has shown to represent combinations of dishes which are palatable and which, if eaten in usual amounts, will supply protein and energy in proportions which accord with usual dietary standards. Menus such as these are more commonly served at lunch or at supper, but they might equally well be served for dinner, the selection of dishes for any meal being of course chiefly a matter of custom and convenience for those who have any range of choice.

Suggested bills of fare in which cheese dishes are the chief source of protein and fat.

MENU NO. 1.

Macaroni and cheese (p. 26 or p. 27).
Raisin bread or date bread.
Orange and water-cress salad.
Baked apples.
Sugar cookies.
Cocoa.

MENU NO. 2.

Cheese fondue (p. 24 or p. 25).
Toast, zweiback, or thin and crisp baking-powder biscuit.
Celery.
Potatoes, baked, boiled, or fried in deep fat.
Peas, or some other fresh vegetables.

MENU NO. 2—Continued.

Coffee.
Fruit salad with crisp cookies or meringues.

MENU NO. 3.

Clear soup.
Baked eggs with cheese (p. 29) or Boston roast (p. 28).
Baked potatoes.
Lettuce salad.
A sweet jelly, crab apple or quince for example, or a preserve.
Rye bread.
Orange or banana shortcake.
Tea.

These bills of fare should be taken as suggestive merely and not as a solution of the problem. In fact, the whole art of making bills of fare needs developing. There is abundant evidence that overeating, where it exists, is frequently due to the fact that meals are not skillfully planned. People often continue eating after they have taken

enough in total bulk because they have not had all they want of some particular kind of food. The meal has contained too large a percentage of proteid or too much starch; has been too moist or too dry; too highly flavored or not sufficiently flavored. Bill-of-fare making calls not only for knowledge of food values but also for skill in combining flavors and textures.

In this discussion of menu making, and of the use of cheese as an integral part of the diet, the aim has been to suggest ways of using cheese to add to the palatability of meals made up of usual dishes, and to suggest dishes containing cheese which could serve as substitutes for meat dishes when so desired, and also for dishes of many sorts to be used as taste suggests and in which the nutritive value as well as the flavor is increased by the addition of cheese. If cheese is used and in quantity, it is obvious that some other proteid and fat foods should be diminished, in order that the meal or day's menu may not be unduly hearty.

For the convenience of the housekeeper, a number of recipes for cheese dishes are given in later pages, these being preceded by directions for making cottage cheese and other similar cheeses which are usually made in the home.

HOMEMADE CHEESE.

Even as late as a generation or two ago cheese of different kinds was made at home for family use, as sour-milk or cottage cheese still is, and cheese making was very generally a farm industry, cheese, like butter, being sold by the farmer who made it. Cottage cheese is very commonly homemade. Most types of cheese, however, are now as a rule made on a large scale in factories where advantage may be taken of labor-saving devices. The general topic of farm cheese making has been considered in an earlier bulletin of this series,¹ prepared by the Dairy Division of the Bureau of Animal Industry.

Curds and Whey.

Cheese curds and whey, an old-fashioned dish, which is often spoken of in accounts of life in earlier times, sometimes refers to sour-milk curd and sometimes to curd separated with rennet. This dish when made with rennet is much like junket and though far less common to-day than was once the case is wholesome and palatable.

Cottage Cheese.

This cheese is very commonly prepared in the home, and the process of making it is very simple. It consists merely of curdling the milk, separating the curd from the whey, seasoning, and pressing it.

The curd is formed by the souring of the milk, and the process is hastened if the milk is kept warm, the best temperature being about blood heat, 96° F. A temperature much above this should be avoided, as the curd is likely to become hard and

¹ U. S. Dept. Agr., Farmer's Bul. 166.

tough if much heated. The danger is usually not that the whole will be overheated but that the portion nearest the fire will be. In the old-fashioned kitchen there was usually a place where the milk could stand till it was uniformly warm throughout. With our present cooking arrangements it is often desirable to hasten the process. This may be done by setting the milk into a pan of warm water or by pouring hot water directly into the milk itself. The effect of the latter method is to remove much more of the acid than when the whey is left undiluted. Some consider this a great advantage.

If, for any reason, the curd is overheated, it should be put through a meat chopper. This will insure cottage cheese of excellent texture.

If the milk is thoroughly chilled before the whey is drained off it retains more of the fat than if this is done when warm. Under no circumstances, however, is much of the fat retained in cottage cheese. It is therefore more economical to make it out of skim milk and to add the fat to the curd in the form of butter or cream.

Chopped parsley, caraway seeds, chopped olives, and pimiento may all be used for flavoring if such flavored cheese is preferred to plain cottage cheese.

Cottage cheese¹ is most commonly consumed immediately, but if made in quantity for commercial purposes, it may be packed in tubs and placed in cold storage. Sometimes it is formed into rolls or blocks and wrapped in tinfoil when marketed. Such cheese is used without ripening.

Though cottage cheese is usually made by allowing the milk to sour naturally, it is sometimes more convenient to curdle the milk by adding rennet, and some housekeepers have a preference for cottage cheese thus made, since the flavor is milder and the acid taste which it possesses when made from sour milk is lacking.

Sour-Cream Cheese.

When cream is to be made into cheese similar to cottage cheese, it should be drained without having previously been heated. The drainage is facilitated by moistening the cloth in salt water before the cream is poured in. The curd is formed either by souring or by the addition of rennet.

Uncooked Curd, or French Cottage Cheese.

The French make cheese from sour milk without heating it. They pour the milk into earthen molds which have holes in the bottom. A very fine sieve may be used instead of the molds. The whey drips out and the curd assumes a custardlike consistency and takes the shape of the mold. When sufficiently stiff, the cheese is chilled, and is eaten with sweet cream and sugar. It is a staple dessert in many French families, especially in hot weather, and is delicious served with acid fruit, such as currants, or with strawberries.

Junket.

If cottage cheese is made from sweet milk and rennet and served without breaking and separating the curd and whey, the dish is called junket. It is customary to season it a little, as with grated nutmeg or with cinnamon and sugar.

Buttermilk Cheese.

At the Wisconsin Experiment Station² a method has been devised for making a soft moist cheese out of buttermilk. When made on a large scale, as it might be in creameries, there are various precautions to be taken which are pointed out in the publication cited. In making it in small quantities, these precautions are unnecessary, and the method is even simpler than that of making cottage cheese, because the quality does not depend so much on the temperature.

To make the buttermilk cheese, heat buttermilk gradually to about 130° or 140° F. Allow it to cool and strain it. As the curd will settle to the bottom, most of the whey may be poured off before the draining is begun.

This cheese is, of course, almost wholly without fat and yet, probably because the particles of curd are very finely divided, it has a smooth consistency, which suggests the presence of fat. It may be served seasoned with salt only or it may be mixed with butter or cream and seasonings. It is suitable for combining with olives and pimientos, as recommended on page 34, or for any use to which the ordinary cream cheeses are put.

Buttermilk Cream.

This product also was devised by the Wisconsin Experiment Station.¹ By controlling the temperature in heating the buttermilk and not allowing it to go above 100° F., a compound is made which after draining has the consistency of a very thick cream. It is claimed by the station investigators that this "cream" is suitable for eating on bread in place of butter.

The recipes on pages 34 and 35 suggest ways of making a salad dressing out of buttermilk cream.

Devonshire Cream.

Devonshire cream somewhat resembles sweet cream in flavor and consistency. It is very much liked in England, where it is commonly eaten with fresh or preserved fruit, but is not so well known in America.

To make Devonshire cream, allow a pan of whole milk to stand for 24 hours in a cool place or for 12 hours in a warmer place. Place the pan on the cooler part of the stove and heat until the milk is very hot, but not to the boiling point. If heated too much a thick skin will form on the surface. The more slowly the milk is heated the better. Having been heated, the milk should be kept in a cool place for 24 hours and then skimmed. The thick cream obtained has a characteristic flavor and texture.

CHEESE DISHES AND THEIR PREPARATION.

The list of cheese dishes in the culinary literature of this and other countries is a long one, but most of them are variations of a comparatively small number of general types. Those which have been selected and studied experimentally represent the principal types and in many cases have been adapted to American methods of preparations and tastes. In some instances, this has resulted in new and perhaps more rational combinations than those which served as models.

For convenience, the cheese dishes included in this bulletin have been grouped under the following heads:

- (1) Cheese dishes which may serve as meat substitutes.
- (2) Cheese soups and vegetables cooked with cheese.
- (3) Cheese salads, sandwiches, and similar dishes.
- (4) Cheese pastry, cheese sweets, and similar dishes.

Variety may be obtained in the recipes by varying the flavorings. Among the best flavorings for cheese dishes are onion, chives, and the ordinary green sweet pepper. Since the cheese needs very little

¹ Loc. cit.

cooking, however, and onion or the pepper needs a great deal, they should always be previously cooked, either by stewing in a very little water, or by cooking in butter. The seeds of the pepper, of course, should be removed before cooking. Where chopped celery is used, as it may be in most of these dishes, it, too, should be cooked beforehand until tender. Other good flavors are mustard, curry powder, onion juice, chopped olives, pimiento, and, according to European recipes, nutmeg or mace.

In preparing the cheese it often has been found convenient to use a very coarse grater having slits instead of the usual rounded holes. Such a grater, in spite of its name, shaves the cheese instead of grating it. When the cheese is soft this is an advantage, since the grater does not become clogged.

CHEESE DISHES WHICH MAY BE USED IN THE SAME WAY AS MEAT.

Meat is wholesome and relished by most persons, yet it is not essential to a well-balanced meal and there are many housekeepers who for one reason or another are interested in lessening the amount of meat which they provide or to substitute some other foods for it. The problem with the average family is undoubtedly more often the occasional substitution of other palatable dishes for the sake of variety, for reasons of economy, or for some other reason than the general replacement of meat dishes by other things.

Foods which are to be served in place of meat should be rich in protein and fat and should also be savory. Cheese naturally suggests itself as a substitute for meat, since it is rich in the same kinds of nutrients which meat supplies, is a staple food with which everyone is familiar, and is one which can be used in a great variety of ways. In substituting cheese for meat, especial pains should be taken to serve dishes which are relished by the members of the family. A number of recipes for dishes which contain cheese are given below. They are preceded by several recipes for cheese sauces which, as will appear, are called for in the preparation of some of the more substantial dishes.

Cheese Sauce No. 1.

1 cupful of milk.

2 tablespoonfuls of flour.

1 ounce of cheese ($\frac{1}{4}$ cupful of grated cheese).

Salt and pepper.

Thicken the milk with the flour and just before serving add the cheese, stirring until it is melted.

This sauce is suitable to use in preparing creamed eggs, or to pour over toast, making a dish corresponding to ordinary milk toast, except for the presence of cheese. It may be seasoned with a little curry powder and poured over hard-boiled eggs.

Cheese Sauce No. 2.

Same as cheese sauce No. 1, except that the cheese is increased from 1 to 2 ounces.

This sauce is suitable for using with macaroni or rice, or for baking with crackers soaked in milk. (See p. 27.)

Cheese Sauce No. 3.

Same as cheese sauce No. 1, except that two cupfuls of grated cheese or 8 ounces are used. This may be used upon toast as a substitute for Welsh rabbit.

Cheese Sauce No. 4.

Same as cheese sauce No. 2, save that 2 tablespoonfuls of melted butter are mixed with the flour before the latter is put into the milk. This sauce is therefore very rich in fat and has only a mild flavor of cheese.

Among the recipes for dishes which may be used like meat, the first 30 are such that, eaten in usual quantities, they will provide much the same kind and amount of nutritive material as the ordinary servings of meat dishes used at dinner. In several cases there is a resemblance in appearance and flavor to common meat dishes, which would doubtless be a point in their favor with many families.

While, chiefly owing to custom, it may not accord with the taste of the family to serve cheese dishes at dinner in place of meat, it is much more in accord with usual dietary habits in American homes to serve such dishes at least occasionally for lunch, for supper, or for breakfast; that is, for a less formal meal than dinner. The last group of recipes in this section, beginning with "breakfast cereals with cheese," supply rather smaller proportions of nutritive materials than those in the first group and so may be more suitable for use at the less hearty meals. There is no hard and fast line to be drawn between the two groups, however, and many of the recipes may be used interchangeably.

In the recipes calling for large amounts of cheese the food value is given, not in figures, but in comparison with beef of average composition and average percentage of waste. This comparison is necessarily rough owing to the varying composition of the foods and the varying weights of such ingredients as a cupful of grated cheese or bread crumbs. In making the comparisons, beef of average composition has been considered to have 15.2 per cent of protein, and a fuel value of 935 calories per pound; ordinary American cheese has been considered to have 26 per cent of protein and a fuel value of 1,965 calories per pound. After many weighings, 4 ounces was decided to be the average weight of a cupful of cheese and $2\frac{1}{2}$ ounces the average weight of a cupful of bread crumbs. These weights have been taken, therefore, in calculating the food value of dishes. When cheese is very soft, however, it may be pressed into a cup and measured like butter. Under these circumstances, the weight of a cupful of cheese may be considered one-half a pound. The price of cheese

is taken as 22 cents a pound, of butter 25 cents a pound, of eggs 25 cents a dozen, in this and all similar calculations in this bulletin. Prices vary with time, place, and season. Those mentioned above are such as were paid for materials at the time the experiments here summarized were made and are not extreme values in either direction. Like all such estimates, the calculations are only relative, and the housekeeper who wishes to estimate the comparative cost of the cheese dishes and other foods can readily do so by taking into account the amount of materials used and the prices paid for ingredients at any particular time.

Cheese Fondue No 1.

1½ cupfuls of soft, stale bread crumbs.	4 eggs.
6 ounces of cheese (1½ cupfuls of grated cheese or 1½ cupfuls of cheese grated fine or cut into small pieces.)	1 cupful of hot water.
	½ teaspoonful of salt.

Mix the water, bread crumbs, salt, and cheese; add the yolks thoroughly beaten; into this mixture cut and fold the whites of eggs beaten until stiff. Pour into a buttered baking dish and cook 30 minutes in a moderate oven. Serve at once.

The food value of this dish, made with the above quantities, is almost exactly the same as that of a pound of beef of average composition and a pound of potatoes combined. It contains about 80 grams of proteids and has a fuel value of about 1,300 calories. Estimated cost, 18 cents, calculated as explained on p. 23.

Cheese Fondue No. 2.

1½ cupfuls of hot milk.	½ of a pound of cheese (1½ cupfuls of grated cheese or 1 cupful of cheese cut into small pieces).
1½ cupfuls of soft, stale bread crumbs.	
1 tablespoonful of butter	
4 eggs.	½ teaspoonful of salt.

Prepare as in previous recipe.

The protein value of this dish is equal to that of 1½ pounds of potato and beef, the fuel value, however, being much in excess of these. Calculated cost (see p. 23), 22 cents.

In making either of these fondues, rice or other cereals may be substituted for bread crumbs. One-fourth cupful of rice measured before cooking, or one cupful of cooked rice or other cereals, should be used.

A comparison of the recipes for the two fondues may indicate the general principle on which the recipes in this bulletin have been worked out. The second recipe is one commonly found in cookbooks. In the first one, the butter has been omitted and water substituted for milk and the amount of cheese is slightly increased. This makes a somewhat cheaper dish and one which is less rich because its percentage of fat is not so great. For this reason it is easier to adjust to the ordinary bill of fare. A dish in which there is combined cheese with its large percentage of fat, butter with its 85 per cent of fat, and eggs with their 10 per cent of fat, is too rich to admit of being combined rationally with other fatty dishes. It therefore limits the number of dishes that may be served with it, making milk soup, for example, or dishes containing white sauce or those containing much butter or oil seem out of place. The omission of butter from the ordinary recipes and the substitution of water or skimmed milk for whole milk may perhaps be the means of making cheese dishes more wholesome and more generally acceptable.

Another advantage of omitting butter from cheese dishes and of substituting water or skimmed milk for whole milk is that it makes it possible to increase the amount of cheese without making the dish too rich. This is of advantage to those who like the flavor of cheese, and also, because it tends to increase the tissue-forming value of the dish, particularly if skimmed milk is used rather than water.

Boiled Fondue.

1½ cupfuls of bread crumbs.	1 egg.
1½ cupfuls of milk.	2 tablespoonfuls of butter.
1½ cupfuls of cheese cut into small pieces.	6 ounces of crackers.

Soak the bread in the milk. Melt the butter and add the cheese. When the cheese has melted add the soaked crumbs, the eggs slightly beaten, and the seasoning. Cook a short time and serve on toasted crackers.

Since it consists of essentially the same ingredients, the food value of this dish is obviously much the same as that of fondue made in other ways.

Rice Fondue.

1 cupful of boiled rice.	½ teaspoonful of salt.
2 tablespoonfuls of milk.	1 teaspoonful of some commercial meat
4 eggs.	sauce, or similar flavoring.
1 cupful of grated cheese.	

Heat the rice in the milk, add the other ingredients, and cook slowly until the cheese is melted. Serve on crackers or toast.

The food value is not far from that of a pound of beef of average composition, and the calculated cost (see p. 23) is 15 cents.

Corn and Cheese Souffle.

1 tablespoonful of butter.	1 cupful of chopped corn.
1 tablespoonful of chopped green pepper.	1 cupful of grated cheese.
½ cupful of flour.	3 eggs.
2 cupfuls of milk.	½ teaspoonful of salt.

Melt the butter and cook the pepper thoroughly in it. Make a sauce out of the flour, milk, and cheese (see p. 23); add the corn, cheese, yolks, and seasoning; cut and fold in the whites beaten stiffly; turn into a buttered baking dish and bake in a moderate oven 30 minutes.

Made with skimmed milk and without butter, this dish has a food value slightly in excess of a pound of beef and a pound of potatoes. Calculated cost (see p. 23), about 20 cents.

Welsh Rabbit.

1 tablespoonful of butter.	½ pound of cheese, cut into small pieces.
1 teaspoonful of cornstarch.	½ teaspoonful each of salt and mustard.
½ cupful of milk.	A speck of cayenne pepper.

Cook the cornstarch in the butter; then add the milk gradually and cook two minutes; add the cheese and stir until it is melted. Season and serve on crackers or bread toasted on one side, the rabbit being poured over the untoasted side. Food value is that of about three-fourths of a pound of beef. Calculated cost (see p. 23), 13 cents.

Tomato Rabbit.

2 tablespoonfuls of butter.	$\frac{1}{2}$ teaspoonful of soda.
2 tablespoonfuls of flour.	1 pound of cheese.
$\frac{1}{2}$ cupful of milk.	2 eggs, slightly beaten.
$\frac{1}{2}$ cupful of stewed and strained tomatoes.	Salt, mustard, cayenne pepper.

Cook the butter and the flour together, add the milk, and as soon as the mixture thickens add tomatoes and soda. Then add cheese, eggs, and seasoning. Serve on toasted whole wheat or Graham bread.

Green Corn, Tomato, and Cheese.

1 tablespoonful of butter.	2 egg yolks.
2 cups of grated cheese.	1 teaspoonful of salt.
$\frac{1}{2}$ cup of canned or grated fresh corn.	$\frac{1}{2}$ teaspoonful of paprika.
1 ripe pimienta.	1 clove of garlic.
$\frac{1}{2}$ cup of tomato purée.	4 slices of bread.

Into the melted butter stir the cheese until it, too, is melted. Then add the corn and pimienta, stir for a moment and add the egg yolks beaten and mixed with the tomato juice and the salt and paprika. Have ready the bread toasted on one side and very lightly rubbed on its untoasted side with the garlic cut in two. Pour the mixture over the untoasted side of the bread and serve at once. A poached egg is sometimes placed on top of each portion, making a very nutritious combination.

Macaroni and Cheese No. 1.

1 cupful of macaroni, broken into small pieces.	2 tablespoonfuls of flour.
2 quarts of boiling salted water.	$\frac{1}{2}$ to $\frac{1}{2}$ pound of cheese.
1 cupful of milk.	$\frac{1}{2}$ teaspoonful of salt.
	Speck of cayenne pepper.

Cook the macaroni in the boiling salted water, drain in a strainer, and pour cold water over it to prevent the pieces from adhering to each other. Make a sauce out of the flour, milk, and cheese. (See p. 23.) Put the sauce and macaroni in alternate layers in a buttered baking dish, cover with buttered crumbs, and heat in oven until crumbs are brown.

Macaroni and Cheese No. 2.

A good way to prepare macaroni and cheese is to make a rich cheese sauce and heat the macaroni in it. (See p. 23.) The mixture is usually covered with buttered crumbs and browned in the oven. The advantage of this way of preparing the dish, however, is that it is unnecessary to have a hot oven, as the sauce and macaroni may be reheated on the top of the stove.

Macaroni with Cheese and Tomato Sauce.

Boiled macaroni may be heated in tomato sauce and sprinkled with grated cheese just before serving.

Italian Macaroni and Cheese.

1 cupful of macaroni broken into small pieces.	2 cloves.
2 quarts of boiling salted water.	$1\frac{1}{2}$ cupfuls of tomato sauce.
$\frac{1}{2}$ onion.	$\frac{1}{2}$ cupful or more of grated cheese.

Cook the macaroni in the boiling salted water with the onion and cloves. Drain, remove the onion and cloves, reheat in tomato sauce, and serve with grated cheese.

Cheese and Macaroni Loaf.

$\frac{1}{2}$ cupful of macaroni broken into small pieces.	1 teaspoonful each of chopped onion and parsley.
1 cupful of milk.	3 eggs.
1 cupful of soft bread crumbs.	1 teaspoonful of salt.
1 tablespoonful of butter.	$\frac{1}{2}$ cupful of grated cheese.
1 tablespoonful of chopped green pepper.	

Cook the macaroni in boiling salted water until tender, and rinse in cold water. Cook the parsley, onion, and pepper in a little water with the butter. Pour off the water or allow it to boil away. Beat the egg white and yolk separately. Mix all the ingredients, cutting and folding in the stiffly beaten whites at the last. Line a quart baking dish with buttered paper; turn the mixture into it; set the baking dish in a pan of hot water, and bake in a moderate oven from one-half to three-fourths of an hour. Serve with tomato sauce.

Baked Rice and Cheese No. 1.

1 cupful of uncooked rice and	2 tablespoonfuls of flour.
4 cupfuls of milk;	$\frac{1}{2}$ pound of cheese.
or,	$\frac{1}{2}$ teaspoonful of salt.
3 cupfuls of cooked rice and	
1 cupful of milk.	

If uncooked rice is used, it should be cooked in 3 cupfuls of milk. Make a sauce with one cupful of milk, add the flour, cheese, and salt. (See p. 23.) Into a buttered baking dish put alternate layers of the cooked rice and the sauce. Cover with buttered crumbs and bake until the crumbs are brown. The proteids in this dish, made with rice cooked in milk, are equal to those of nearly $1\frac{1}{4}$ pounds of average beef. If skimmed milk is used, the fuel value is equal to nearly $3\frac{1}{4}$ pounds of beef. Whole milk raises the fuel value still higher. Estimated cost (see p. 23), 28 cents.

Baked Rice and Cheese No. 2.

$\frac{1}{2}$ pound of cheese grated or cut into small pieces.	1 cupful of rice.
	Milk as needed.

Cook the rice; put into a buttered baking dish alternate layers of rice and cheese; pour over them enough milk to come halfway to the top of the rice; cover with buttered crumbs and brown.

If the rice is cooked in milk either whole or skimmed, and one cup of milk is used to pour over it, this dish has as much protein as $1\frac{1}{4}$ pounds of beef of average composition, and a much higher fuel value.

Baked Crackers and Cheese No. 1.

9 or 10 butter crackers or Boston crackers.	$1\frac{1}{2}$ cupfuls of milk.
$\frac{1}{4}$ pound of cheese or 1 cupful of grated cheese.	$\frac{1}{4}$ teaspoonful of salt.
	Flour.

Split the crackers, if the thick sort are selected, or with a sharp knife cut them into pieces of uniform size. Pour the milk over them and drain it off at once. With the milk, flour, cheese, and salt, make a sauce. (See p. 23.) Into a buttered baking dish put alternate layers of the soaked crackers and sauce. Cover with bread crumbs and brown in the oven, or simply reheat without covering with crumbs.

The above is a very satisfactory substitute for macaroni and cheese, and can be prepared in less time.

Baked Crackers and Cheese No. 2.

9 or 10 butter crackers or soda crackers.	| 1 cupful of grated cheese.
2 cupfuls of hot milk, whole or skimmed.	| $\frac{1}{4}$ teaspoonful of salt.

This is more quickly prepared than the preceding recipe, but as the milk is likely to curdle, it has not so good a consistency.

Soak the crackers in the milk; place them in a buttered baking dish in alternate layers with the cheese; pour the remaining milk over them and bake. This dish may be covered with buttered crumbs. Variety may be secured, in either this recipe or the preceding one, by putting a very small amount of mixed mustard on each cracker.

Cheese Rolls.

A large variety of rolls may be made by combining legumes, either beans of various kinds, cowpeas, lentils, or peas, with cheese of various kinds, and adding bread crumbs to make the mixture thick enough to form into a roll. Beans are usually mashed, but peas or small Lima beans may be combined whole with bread crumbs and grated cheese, and enough of the liquor in which the vegetables have been cooked may be added to get the right consistency. Or, instead of beans or peas, chopped spinach, beet tops, or head lettuce may be used. Homemade cottage cheese, and the soft cream cheese of commerce, standard cheese, or English dairy may be used.

Boston Roast.

1 pound can of kidney beans or equivalent quantity of cooked beans.	| Bread crumbs.
$\frac{1}{4}$ pound of grated cheese.	| Salt.

Mash the beans or put them through a meat grinder. Add the cheese and sufficient bread crumbs to make the mixture stiff enough to be formed into a roll. Bake in a moderate oven, basting occasionally with butter and water. Serve with tomato sauce. This dish may be flavored with onions, chopped and cooked in butter and water.

Pimiento and Cheese Roast.

2 cupfuls of cooked Lima beans.	| 3 canned pimientos chopped.
$\frac{1}{4}$ pound of cream cheese, commercial or homemade.	| Bread crumbs.

Put the first three ingredients through a meat chopper. Mix thoroughly and add bread crumbs until it is stiff enough to form into a roll. Brown in the oven, basting occasionally with butter and water.

Nut and Cheese Roast.

1 cupful of grated cheese.	| 1 tablespoonful of butter.
1 cupful of chopped English walnuts.	| Juice of half a lemon.
1 cupful of bread crumbs.	| Salt and pepper.
2 tablespoonfuls of chopped onion.	

Cook the onion in the butter and a little water until it is tender. Mix the other ingredients and moisten with water, using the water in which the onion has been cooked. Pour into a shallow baking dish and brown in the oven.

Cheese and Spinach Roll.

2 quarts of spinach.	| Salt.
1 cupful of grated cheese.	| Bread crumbs.
1 tablespoonful of butter.	

Cook the spinach in water for 10 minutes. Drain off the water, add the butter, cook until tender, and chop. Add the grated cheese and then bread crumbs enough to make a mixture sufficiently stiff to form into a roll, or leave more moist and cook in a baking dish.

Vegetable and Cheese Rolls.

For the spinach of the above recipe there may be substituted beet tops, Swiss chard, or the outer leaves of lettuce.

Cheese Used in the Stuffing of Meat.

The mixtures in the preceding two recipes may be used for stuffing veal or beef. Eggs may be added if desired, and chopped onions or parsley may be cooked with the greens. In Italy roasts thus prepared are sprinkled with a little finely chopped garlic, and covered with celery tops and thin slices of bacon or fat pork before roasting.

Creamed Cheese and Eggs.

3 hard-boiled eggs.	| Speck of cayenne.
1 tablespoonful of flour.	| $\frac{1}{2}$ cupful or 1 ounce grated cheese.
1 cupful of milk.	| 4 slices of toast.
$\frac{1}{2}$ teaspoonful of salt.	

Make a thin white sauce with the flour and milk and seasonings. Add the cheese and stir until melted. Chop the whites and add them to the sauce. Pour the sauce over the toast, force the yolks through a potato ricer or strainer, sprinkle over the toast.

Baked Eggs with Cheese.

4 eggs.	| $\frac{1}{2}$ teaspoonful salt.
1 cupful, or 4 ounces, of grated cheese.	| A few grains of Cayenne pepper.
1 cupful of fine, soft, stale bread crumbs.	

Break the eggs into a buttered baking dish or into ramekins and cook them in a hot oven until they begin to turn white around the edge. Cover with the mixture of crumbs, cheese, and seasonings. Brown in a very hot oven. In preparing this dish it is essential that the oven be very hot or the egg will be too much cooked by the time the cheese is brown. To avoid this, some cooks cover the eggs with white sauce before adding crumbs.

The food value of the dish is very close to that of a pound of beef of average composition. The estimated cost (see p. 23) is about 14 cents.

For those who are particularly fond of cheese the amount of cheese in this recipe may be very much increased, thus making a much more nourishing dish. Or the amount may be reduced so as to give hardly more than a suggestion of the flavor of cheese.

Scrambled Eggs with Cheese.

$\frac{1}{2}$ pound of cheese grated or cut into small pieces.	| 1 tablespoonful of chopped parsley.
8 eggs.	| A pinch of nutmeg.
	| $\frac{1}{2}$ teaspoonful of salt.

Beat the eggs slightly, mix them with the other ingredients, and cook over a very slow fire, stirring constantly, so that the cheese may be melted by the time the eggs are cooked. In food value the dish is equal to nearly 2 pounds of average beef. The calculated cost (see p. 23) is about 30 cents.

Swiss Eggs.

4 eggs.	| Salt and pepper.
$\frac{1}{2}$ cupful of cream.	| $\frac{1}{2}$ cupful of grated cheese.
1 tablespoonful of butter.	

Heat the butter and cream together, break in the eggs whole, sprinkle with salt and pepper. When nearly done, add the cheese. Serve on buttered toast. Strain the cream over the toast.

Cheese Omelet No. 1.

Cheese may be introduced into omelets in several ways. An ordinary omelet may be served with thin cheese sauce made in the following proportions:

1½ tablespoonfuls of flour.
 ¼ cupful of grated cheese.
 1 cupful of milk.

This sauce may also be added to omelets in which boiled rice, minced meat, or some other nutritious material has been included.

Cheese Omelet No. 2.

Grated cheese may be sprinkled over an ordinary omelet before it is served.

Cheese Omelet No. 3.

Yolks of 2 eggs.	Salt and pepper.
2 tablespoonfuls of hot water.	Whites of 4 eggs.
1 cupful of grated cheese.	1 tablespoonful of butter.

Beat the yolks until lemon colored and add the hot water and the seasoning. Beat the whites until they are stiff, and add the cheese. Cut and fold the two mixtures together. Heat the butter in omelet pan and cook the mixture very slowly until it is brown on the underside. If possible, cook the top of the omelet in the oven or by means of a hot plate held over it.

Breakfast Cereals with Cheese.

That cheese combined with cereal foods makes a rational dish as regards the proportion of nutrients it supplies has been pointed out on another page (p. 18). Cheese and some of the crisp "ready to serve" cereal breakfast foods is a combination which is common, the cheese being melted with the cereal food, or simply served with it.

There are many who relish a piece of cheese with the cooked cereal so commonly eaten for breakfast and find such a combination satisfying to appetite and taste. Oatmeal or some other home-cooked breakfast cereal prepared with cheese is palatable, and such dishes have an advantage in that they may be served without cream and sugar. Since such a dish contains considerably more protein than the breakfast cereals as ordinarily served, it has a further advantage in that it may well serve as the principal item of a breakfast menu, instead of a preliminary to other courses. Such a combination as cereals cooked with cheese, toast, fruit, and tea, coffee, or chocolate, makes a palatable as well as nutritious breakfast and one which does not require much work to prepare and to clear away. A recipe for preparing oatmeal with cheese follows. Wheat breakfast foods, either parched or unparched, corn meal, and hominy may be prepared in the same way.

Oatmeal with Cheese.

2 cupfuls of oatmeal.	1 tablespoonful of butter.
1 cupful of grated cheese.	1 level teaspoonful of salt.

Cook the oatmeal as usual. Shortly before serving, stir in the butter and add the cheese, and stir until the cheese is melted and thoroughly blended with the cereal.

The cheese should be mild in flavor and soft in texture. The proportion of cheese used may be increased if a more pronounced cheese flavor is desired.

Cheese with Mush.

Cheese may be added to corn-meal mush or to mush made from any of the corn or wheat preparations now on the market. The addition of cheese to corn-meal mush is particularly desirable when the mush is to be fried.

Fried Bread with Cheese No. 1.

6 slices of bread.	$\frac{1}{2}$ teaspoonful of salt.
1 cupful of milk.	$\frac{1}{2}$ teaspoonful of potassium bicarbonate.
2 ounces of cheese, or $\frac{1}{2}$ cupful of grated cheese.	Butter or other fat for frying.

Scald the milk with the potassium bicarbonate; add the grated cheese, and stir until it dissolves. Dip the bread in this mixture and fry it in the butter. The potassium bicarbonate helps to keep the cheese in solution. It is desirable, however, to keep the milk hot while the bread is being dipped.

Fried Bread with Cheese No. 2.

Cut stale bread into thin pieces. Put two pieces together with grated cheese between them; dip into a mixture of egg and milk and fry in butter or other fat.

Roman Gnocchi.

$\frac{1}{2}$ cupful of butter.	2 egg yolks.
$\frac{1}{4}$ cupful of flour.	$\frac{3}{4}$ cupful of grated cheese.
$\frac{1}{4}$ cupful of cornstarch.	Salt.
2 cupfuls of milk.	

Melt the butter; cook the cornstarch thoroughly, and then the flour in the butter; add the milk gradually; cook three minutes, stirring constantly; add the yolks and one-half cupful of the cheese. Pour into a buttered shallow pan and cool. Cut into squares; place them on a platter a little distance apart; sprinkle with remaining cheese, and brown in the oven.

The proteid value is that of three-fourths of a pound of average beef, the fuel value that of $1\frac{1}{2}$ pounds. Calculated cost (see p. 23), 17 cents.

Cheese Soufflé.

2 tablespoonfuls of butter.	A speck of cayenne.
3 tablespoonfuls of flour.	$\frac{1}{2}$ cupful of grated cheese.
$\frac{1}{2}$ cupful of milk (scalded).	3 eggs.
$\frac{1}{2}$ teaspoonful of salt.	

Melt the butter; add the flour and, when well mixed, add gradually the scalded milk. Then add salt, cayenne, and cheese. Remove from the fire and add the yolks of the eggs, beaten until lemon colored. Cool the mixture and fold into it the whites of the eggs, beaten until stiff. Pour into a buttered baking dish and cook 20 minutes in a slow oven. Serve at once.

The proteid of this recipe is equal to that of half a pound of beef; the fuel value is equal to that of three-fourths of a pound.

Cheese Soufflé with Pastry.

2 eggs.	$\frac{1}{2}$ cupful of Swiss cheese cut into small pieces.
$\frac{3}{4}$ cupful of thin cream.	Salt, cayenne pepper, and nutmeg
1 cupful of grated cheese.	

Add the eggs to the cream and beat slightly, then add the cheese and seasoning. Bake 15 minutes in a hot oven, in patty tins lined with puff paste.

Cheese Croquettes.

3 tablespoonfuls of butter.
 $\frac{1}{4}$ cupful of flour.
 $\frac{2}{3}$ cupful of milk.
 Yolks of 2 eggs.

1 cupful of cheese cut in very small pieces.
 $\frac{1}{2}$ cupful grated cheese.
 Salt and pepper.

Make with a white sauce, using the butter, flour, and the milk. Add the unbeaten yolks and stir until well mixed, then add the grated cheese. As soon as the cheese melts, remove from the fire, fold in the pieces of cheese, and add the seasoning. Spread in a shallow pan and cool. Cut into squares or strips, cover with an egg and crumb mixture, and fry in deep fat.

Fried Cheese Balls.

$1\frac{1}{2}$ cupfuls of grated cheese.
 1 tablespoonful of flour.

The whites of 3 eggs.
 Salt, pepper, cracker dust.

Beat the whites of the eggs; add the other ingredients; make into balls and roll in cracker dust. If the amount of flour is doubled, the mixture may be dropped from a spoon and fried without being rolled in crumbs.

CHEESE SOUPS AND VEGETABLES COOKED WITH CHEESE.

In these dishes the cheese is used not only to add nutritive value, but also to give its characteristic flavor either to materials otherwise rather mild in taste (as in potatoes with cheese) or to combine its flavor with that of some more highly flavored vegetables (as in cheese and vegetable soup). The ingenious housekeeper whose family is fond of cheese can doubtless think of many desirable ways of making such combinations besides those given in the following recipes:

Milk and Cheese Soup.

3 cupfuls of milk, or part milk and part stock.
 $1\frac{1}{2}$ tablespoonfuls of flour.

1 cupful of grated cheese.
 Salt and paprika.

Thicken the milk with the flour, cooking thoroughly. This is best done in a double boiler, with frequent stirrings. When ready to serve, add the cheese and the seasoning.

The proteids in this soup are equal in amount to those in five-sixths of a pound of beef of average composition; its fuel value is higher than that of a pound of beef.

Cheese and Vegetable Soup.

2 cupfuls of stock.
 2 tablespoonfuls of finely chopped carrots.
 1 tablespoonful of chopped onion.
 A very little mace.
 2 tablespoonfuls of butter.

2 tablespoonfuls of flour.
 $1\frac{1}{2}$ teaspoonfuls of salt.
 1 cupful of scalded milk.
 $\frac{1}{2}$ cupful of grated cheese.

Cook the vegetables a short time in one-half of the butter, add the stock and the mace, boiling 15 or 20 minutes. Strain and add the milk. Thicken with flour cooked in the remaining butter. Just before serving, stir in the cheese and cook until it is melted.

Scalloped Potatoes with Cheese No. 1.

Put into a buttered baking dish alternate layers of cheese sauce No. 1 (see p. 22) and cold boiled potatoes, sliced or cut into dice. Cover with buttered crumbs and bake.

Scalloped Potatoes with Cheese No. 2.

Put into a buttered baking dish alternate layers of white sauce and cold boiled potatoes, either sliced or cut into dice. Put over the top a layer of grated cheese and then a layer of buttered bread crumbs. Brown in the oven.

Scalloped Cabbage or Cauliflower with Cheese.

Cauliflower or cabbage may be scalloped according to either of the recipes given for scalloped potatoes and cheese. Sometimes a cauliflower is boiled whole, spread with grated cheese, then with buttered bread crumbs. It is browned in the oven and served with white sauce poured around it.

Cheese with Potato Puffs.

1 cupful of mashed potatoes.
 $\frac{1}{4}$ cupful of milk.
 1 egg.

$\frac{1}{2}$ teaspoonful of salt.
 $\frac{1}{2}$ cupful of grated cheese.

Beat the potatoes and milk together until thoroughly mixed. Add the egg and the salt and beat thoroughly. Finally add the cheese. Bake in muffin tins in a slow oven 10 or 15 minutes.

A similar dish may be made by scooping out the inside of a baked potato and mixing it with cheese as above. Fill the potato-skin shell with the mixture, return to the oven, and bake until light brown.

Potatoes with Cheese Sauce.

Cut boiled potatoes into cubes and serve with cheese sauce No. 1. (See p. 22.) This is one of the cheese and vegetable dishes most frequently found on restaurant menus.

CHEESE SALADS, SANDWICHES, AND SIMILAR CHEESE DISHES.

Cheese of one sort or another is a very common accompaniment of salads, and the combination is rational as well as palatable, for the constituents of the succulent foods—chiefly water and cellulose—supplement the protein and fat of the cheese. Cheese is often used also as a part of the salad.

A number of recipes are given below for cheese salads and other cheese dishes which may be served with dinner or other regular meals, or served as part of a special lunch or special supper. Many of the cheese dishes discussed in other sections are also commonly used for such occasions when something savory is desired which can be easily and quickly prepared.

Cheese with Salads.

Cheese or cheese dishes are an acceptable addition to salads. Neufchâtel or other cream cheese, either plain or mixed with pimientos and olives, may be passed with lettuce or may be cut into slices and served on lettuce.

Cheese balls are often served with salad. They are made of some soft cream cheese, and are frequently combined with chopped chives, olives, sweet peppers, chopped nuts, etc., for the sake of adding flavor. Cooked egg yolk, spinach extract, etc., are sometimes mixed in for the sake of color. If the balls are rolled in chopped chives or parsley, both flavor and color are supplied.

Plain Cheese Salad.

Cut Edam or ordinary American cheese into thin pieces, scatter them over lettuce leaves, and serve with French dressing.

Olive and Pimiento Sandwich or Salad Cheese.

Mash any of the soft cream cheeses and add chopped olives and pimientos in equal parts. This mixture requires much salt to make it palatable to most palates, the amount depending chiefly on the quantity of pimiento used. The mixture may be spread between thin slices of bread or it may be made into a roll or molded, cut into slices, and served on lettuce leaves with French dressing.

Cheese and Tomato Salad.

Stuff cold tomatoes with cream cheese and serve on lettuce leaves with French dressing.

Cheese and Pimiento Salad.

Stuff canned pimientos with cream cheese, cut into slices, and serve one or two slices to each person on lettuce leaves with French dressing.

Cheese Jelly Salad.

$\frac{1}{2}$ cupful of grated cheese.
1 tablespoonful of gelatin.

1 cupful of whipped cream.
Salt and pepper to taste.

Mix the cheese with the whipped cream, season to taste with salt and pepper, and add to the gelatin dissolved in a scant cupful of water. This may be molded in a large mold or in small molds.

When the jelly begins to harden, cover with grated cheese. The jelly should be served on a lettuce leaf, preferably with a cream dressing or a French dressing, to which a little grated cheese has been added.

Cheese Salad and Preserves.

Epicures have devised a dish which consists of lettuce with French dressing served with cream cheese and thick preparations of currants or other fruits preserved in honey or sugar, which, owing to the fact that the seeds have been extracted by a laborious process, are fairly expensive. The soft cheese often found in market is also relatively expensive. There is a suggestion in this dish, however, for others which are much less costly. Buttermilk cream (see p. 21), or ordinary cottage cheese served with lettuce or other green salad and a small amount of rich homemade preserves, is a combination with much the same character, and also very appetizing.

Deviled Eggs with Cheese.

In making deviled eggs, either to be eaten alone or upon lettuce leaves in the form of salad, a little grated cheese may be mixed with the yolks in addition to the usual salad dressing and flavorings with which the yolks are mixed.

Cheese and Celery.

Cut stalks of celery having deep grooves in them into pieces about 2 inches long. Fill the grooves with cream cheese salted or flavored with chopped pimientos, and serve with bread and butter as a salad course or serve as a relish at the beginning of a meal.

Although not cheese dishes, strictly speaking, the following salad dressings made with buttermilk cream (see p. 21) may be included in this section.

Buttermilk Cream Salad Dressing.

$\frac{1}{2}$ cupful of buttermilk cream (see p. 21).	$\frac{1}{2}$ teaspoonful of salt.
1 tablespoonful of vinegar.	Cayenne pepper.

This dressing is particularly suitable for serving with cucumbers.

Buttermilk Cream Horseradish Salad Dressing.

To buttermilk cream add a little grated horseradish and vinegar and salt. Serve on whole or sliced tomatoes.

Cheese Sandwiches.

Mash or grate American cheese, add salt, a few drops of vinegar and paprika, and a speck of mustard. Mix thoroughly and spread between thin slices of bread.

Cheese and Anchovy Sandwiches.

To the mixture mentioned in the preceding recipe, add a little anchovy essence. Sardines mashed or rubbed into a paste or any other fish paste may be used in a similar way.

Pimiento, Olive, and Cheese Sandwiches.

These sandwiches are referred to on page 34.

Cuban Sandwiches.

This sandwich may be described as a kind of club sandwich with cheese. It is usually made large so that it is necessary to eat it with a knife and fork. It may be made in such proportions as to supply a large amount of nourishment.

Cut the crusts from slices of bread. Between two slices lay first lettuce with a little salad dressing or salt on it, then a slice of soft mild cheese and finally thin slices of dill pickles or a little chopped pickle.

Toasted Cheese Sandwiches.

Plain bread and butter sandwiches with fairly thick slices of cheese put between the slices are frequently toasted, and on picnics, or at chafing-dish suppers, are often browned in a pan in which bacon has just been fried.

CHEESE PASTRY, CHEESE SWEETS, AND SIMILAR DISHES.

In the foregoing pages a large number of recipes have been included in which cheese is combined with materials without cooking, as in salads, or used in cooked dishes of creamy or custard-like consistency, as in soufflés and Welsh rabbit or in combination with vegetables or cereals, such as rice.

There are a number of cheese dishes of quite different character in which the cheese is combined with dough, batter, or pastry in various ways, and a number of dishes in which cheese or cheese curd is used

in combinations suitable for dessert. Such sweet dishes were once much more common than they are to-day, as reference to old cookery books will show, but some of them are well worth retaining.

In cheese sweets, flavor and richness are both contributed by the cheese.

When cheese is used in pastry or dough it may serve simply as a flavor, as in cheese sticks or cheese straws, or it may wholly or in part replace with its fat the usual shortening, as butter or other fat, and with its protein (casein) the protein (albumin) of eggs. As an illustration of such a use of cheese, cheese gingerbread may be cited.

Using cheese in this way is often an economy when eggs are scarce. Better results will be obtained if soft cheese is used which can be worked into the dough in much the same way as butter or other shortening. To those who like cheese the flavor which it imparts would be an advantage. However, if a very mild cheese is used in combination with molasses or spice the dish differs a little in flavor from one prepared in the usual way.

CHEESE PASTRIES AND SIMILAR DISHES.

Cheese Biscuit No. 1.

2 cupfuls of flour.
4 teaspoonfuls of baking powder.
2 tablespoonfuls of lard or butter.
 $\frac{7}{8}$ of a cup of milk.

$\frac{1}{4}$ teaspoonful of salt.
Grated cheese sufficient to give desired flavor.

Mix all the ingredients excepting the cheese as for baking powder biscuits. Roll thin, divide into two parts, sprinkle one half with grated cheese, lay the other half of the dough over the cheese, cut out with a small cutter, and bake.

Cheese Biscuit No. 2.

$\frac{1}{4}$ pound of soft cheese.
2 cupfuls of flour.
1 cupful of water.

4 teaspoonfuls of baking powder.
 $1\frac{1}{2}$ teaspoonfuls of salt.

Mix and sift the dry ingredients, then work in the cheese with a fork or with the fingers, and add the water gradually. The approximate amount of water has been given; it is impossible to give the exact amount, as flour differs in its capacity for taking up moisture. Toss the dough on a floured board and roll out and cut with a biscuit cutter. Place in a buttered pan and bake in a quick oven from 12 to 15 minutes. The biscuit may be sprinkled with cheese before being put into the oven.

If the cheese is sufficiently soft it can be measured just as butter is. This recipe, then, would call for $\frac{1}{4}$ cupful.

Cheese Drops.

$2\frac{1}{2}$ tablespoonfuls of milk.
1 teaspoonful of butter.
 $1\frac{1}{4}$ cupfuls of flour.
 $\frac{1}{8}$ teaspoonful of salt.

1 egg.
2 tablespoonfuls of grated Parmesan cheese
or dry American cheese.

Heat the butter and milk to boiling point, add the flour and the salt and stir thoroughly. Remove from the fire, add the egg and cheese and stir until well mixed. When cold, drop in small pieces in deep fat and brown. This makes a good addition to any clear soup or to consommé.

Cheese Wafers.

* Spread grated cheese on thin crackers, heat in the oven until the cheese is melted. Serve with soup or salad.

Cheese Relish.

Spread bread which has been toasted or fried in deep fat with grated cheese, or with grated cheese mixed with a little mustard, then heat in the oven until the cheese is melted. This may be served with salad, or as a relish to give flavor to some dish such as boiled rice or hominy, which has no very marked flavor.

Cheese Straws.

Roll out plain or puff paste until one-fourth of an inch thick. Spread one-half of it with grated cheese. Fold over the other half and roll out again. Repeat the process three or four times. Cut into strips and bake. Serve with soup or salad.

Salad Biscuit.

$\frac{1}{2}$ pound of cheese.	$1\frac{1}{2}$ teaspoonfuls of salt.
2 cupfuls of flour.	1 cupful of water.
4 teaspoonfuls of baking powder.	

Mix as for cheese biscuits No. 1 or No. 2, depending on whether the cheese is hard or soft. (See p. 36.)

Cheese Gingerbread No. 1.

1 cupful of molasses.	2 cupfuls of flour.
4 ounces of cheese.	2 teaspoonfuls of ginger.
1 teaspoonful of soda.	$\frac{1}{2}$ teaspoonful salt.
$\frac{1}{2}$ cupful of water.	

Heat the molasses and the cheese in a double boiler until the cheese is melted. Add the soda and stir vigorously. Mix and sift dry ingredients and add them to the molasses and cheese alternately with the water. Bake 15 minutes in small buttered tins.

Cheese Gingerbread No. 2.

$\frac{1}{2}$ cupful of molasses.	1 teaspoonful of soda.
$\frac{1}{2}$ cupful of sugar.	2 teaspoonfuls of ginger.
4 ounces of cheese.	$\frac{1}{2}$ teaspoonful of salt.
2 cupfuls of flour.	$\frac{1}{4}$ cupful of water.

Rub the cheese and the sugar together. Add the molasses. Mix and sift the dry ingredients and add them to the cheese mixture alternately with the water.

Cheese Custard.

1 cupful of grated cheese.	Yolks of 2 eggs.
$\frac{1}{2}$ cupful of cream or rich milk.	A speck of salt and of paprika.

Mix the cream and the cheese and heat until the cheese is melted. Remove from the fire and add the yolks of the eggs. Bake in paper cases or buttered ramekins. Serve with jelly or preserves.

Cheese Cakes.

1 quart of milk.	A speck of nutmeg.
Rennet.	$1\frac{1}{2}$ ounces of butter.
1 ounce of sugar.	1 ounce of dried currants or small raisins.
Yolks of 2 eggs.	

Warm the milk and add the rennet, using the amount prescribed on the package. Let the milk stand until the curd forms, then break up the curd and strain off the whey. Add the other ingredients to the curd; line patty tins with pastry, fill them with the mixture, and bake.

Brown Betty with Cheese.

Arrange in a deep earthenware baking dish, alternate layers of bread crumbs and thinly sliced apples. Season with cinnamon, also a little clove if desired and brown sugar. Scatter some finely shaved mild full-cream cheese over each layer of apple. When the dish is full, scatter bread crumbs over the top and bake 30 to 45 minutes, placing the dish in a pan of water so that the pudding will not burn.

If preferred, this may be sweetened with molasses mixed with an equal amount of hot water and poured over the top, a half cupful of molasses being sufficient for a quart pudding dish full.

Cheese may be used in place of butter in a similar way in other apple puddings. Apple pie made with a layer of finely shaved cheese over the seasoned apple and baked in the usual way is liked by many who are fond of cheese served with apple pie.

CONCLUSION.

In the foregoing pages information has been summarized regarding the food value of cheese, an important agricultural product, and ways of preparing it for the table. It has been pointed out that, judged by the kind of nutrients it supplies—chiefly nitrogenous material and fat—and the proportion in which they are present, it resembles such foodstuffs as meat, fish, and eggs, which means that like them its rational use in the diet is in combination with other staple foods, to form well-balanced meals.

Experiments have shown that when eaten either raw or carefully cooked, cheese is as thoroughly digested as other staple foods and is not likely to produce physiological disturbance.

An ounce of cheese roughly is equivalent to 1 egg, to a glass of milk, or to 2 ounces of meat.

Although uncooked cheese resembles meat in composition, cheese dishes prepared after ordinary recipes, with milk and shortening, are likely to contain more fat than meat dishes prepared in the usual ways. When, therefore, such cheese dishes are served with other staple foods the combination is likely to contain more fat than the usual meal. If little fat is ordinarily used, this may be an advantage. If a great deal of fat is ordinarily used, it may be desirable to lessen the amount in the cheese dishes. This can readily be done by omitting the shortening and using skim milk or water in the preparation of such dishes, a change which also lessens their cost.

The fact that cheese, like meat, contains neither starch nor cellulose suggests that, like meat, it should be combined with bread, potatoes, and other starchy foods, with vegetables and with sweets. The concentrated character of cheese and many cheese dishes suggests

the use of succulent fruits and vegetables with them. The high percentage of fat in cheese suggests the use of correspondingly small amounts of fat in the accompanying dishes, while the soft texture of cheese dishes as compared with meat makes it reasonable to serve the harder and crustier breads with them.

When cheese is not used as the chief nitrogenous food of a meal it may be introduced into bills of fare in many incidental ways, and thus add materially to that portion of the diet needed for building and repairing body tissue.

Though cheese is so generally used in some way in most families, yet the making of menus with cheese as a central dish is less well understood than more usual food combinations, since there is less experience to serve as a guide. More thought is therefore usually required to arrange such cheese meals in order that they may be palatable and at the same time reasonable in nutritive value.

In order that the diet may remain well balanced, cheese, if used in quantity, should replace foods of similar composition rather than supplement them. The builder who has a choice of materials must have a knowledge of their relative properties if he wishes to use stone instead of brick, or wood in place of iron. It is the same with the housekeeper who wishes to use her available food supply intelligently and whose choice of foods is influenced by their relative cost at a given time or season. The woman who has a knowledge of the relative food value of different articles of diet, and their real food qualities as distinguished from their market value, who understands good methods of cooking and serving foods, and who plans her meals and other housework so that unnecessary labor and expense may be avoided, is taking account of the things which make for economical living as well as for good living.

Some persons seem to believe that cheese or fish or other food is the ideal food for some particular circumstance and that there is a special food or diet suited to each kind of work and to every circumstance of our daily life, and that it would be a great advantage if we could regulate our daily fare with the accuracy a chemist uses in making an experiment. Work, recreation, the amount of clothing we wear, and other details of our daily life are not so regulated, and it is the belief of those who have studied the subject that the best interests of persons living under normal conditions are served if the ideal be rather the regulation of the diet along general lines in accordance with good sense, the teachings of experience, economy, and the available knowledge gained from a scientific study of the subject, due care being taken that the different staple foodstuffs are so combined that all the needs of the body are provided, excessive waste is prevented, and that both undernourishment and excess or overeating are avoided.

Dishes which are liked and the methods followed in preparing them will vary in different countries and at different times, yet this does not of necessity mean that the nutritive value of the diet varies correspondingly. In the same way it is possible for us to vary the selection of our foods and the character of our diet at will, according to the demands of our taste and our purse, without correspondingly changing its value for supplying the needs of the body. This means that the housekeeper, in suitable ways, can use cheese, meat, fish, eggs, and other foods of similar composition as substitutes for one another, being governed by their relative market value at different times and seasons, by the tastes of her family, and similar considerations. If she uses the different foodstuffs with reference to their nutritive value and is skillful in preparing foods in appetizing ways and in serving them in attractive combinations, the daily fare may be both adequate and pleasing, whether she selects cheese or meat or fish or eggs or other foods to supply nitrogenous material and fat. Here, as in all that pertains to housekeeping, true economy is dependent upon a knowledge of materials and skill in using them.